Total No. of printed pages = 4

CSE 1818 OE 41

Roll No. of candidate

2022

B.Tech. 8th Semester End-Term Examination

CSE

ARTIFICIAL INTELLIGENCE

Open Elective – 4

(New Regulation 2017 – 2018 & New Syllabus 2018 – 2019)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) :   (10 × 1 = 10)

    (i)   "AI is the study of how to make computers do things which, at the moment, people do Better" proposed by:

          (a) Bellman, 1978   (b) Winston, 1992

          (c) Rich and Knight, 1991   (d) Nilsson, 1998

    (ii) Which of the given language is not commonly used for AI?

          (a) LISP   (b) PROLOG

          (c) Python   (d) Perl

    (iii) A technique that was developed to determine whether a machine could or could not demonstrate the artificial intelligence known as the _____

          (a) Boolean Algebra   (b) Turing Test

          (c) Logarithm   (d) Turing Machine

    (iv) Among the given options, which is not the required property of Knowledge representation?

          (a) Inferential Efficiency

          (b) Inferential Adequacy

          (c) Representational Verification

          (d) Representational Adequacy

[Turn over

(v) The process of capturing the inference process as a single Inference Rule is known as:

    (a) Clauses   (b) Ponens

    (c) Modus Ponens   (d) Variables

(vi) In artificial Intelligence, knowledge can be represented as:

    (i) Predicate Logic   (ii) Propositional Logic

    (iii) Semantic Nets   (iv) Machine Logic

    (a) Both (i) and (ii)   (b) Only (i)

    (c) (i), (ii) and (iii) only   (d) Only (iv)

(vii) The inference engine works on:

    (a) Forward Chaining   (b) Backward Chaining

    (c) Both (a) and (b)   (d) None of these

(viii) Out of the given options, which of the following algorithms uses the least memory?

    (a) BFS   (b) DFS

    (c) Both BFS and DFS same   (d) Cannot be compared

(ix) An early AI program (language parser) developed by Terry Winograd at MIT is _____.

    (a) BACON   (b) SHRDLU

    (c) STUDENT   (d) SIMD

(x) An example of an early expert system is _____

2. (a) "Application of knowledge is power". Discuss this quote by supporting your answer with Artificial Intelligence (AI) techniques. (7)

    (b) Write the four dimensions of AI and explain with an example of each. (8)

3. (a) (i) Show the Conceptual Dependency (CD) representation of "Gurpreet goes to Gurudwara by car". (4)

      (ii) Translate the sentence "*Everyone who loves all girls is loved by someone*" into formulas in predicate logic. Then convert the formula into Conjunctive Normal Form (CNF). (4)

(b) (i) Suppose you are given the following facts: (3)

$$\forall x, y, z : gt(x,y) \wedge gt(y,z) \rightarrow gt(x,z)$$
$$\forall a, b : succ(a,b) \rightarrow gt(a,b)$$
$$\forall : \neg(x,x)$$

Prove that gt (100, 80).

(ii) Trace the operation of the unification algorithm on each of the following pairs of literals and find the Most General Unifier (MGU).

$$(2 \times 2 = 4)$$

(1) Literal 1: parents $(x,$ father$(x),$ mother (Jyoti)).

Literal 2: parents (Jyoti, father$(y),$ z).

(2) Literal 1: parents $(x,$ father$(x),$ mother (Joon)).

Literal 2: parents (John, father$(y),$ mother(y))

4. (a) Write the Hill climbing algorithm and explain the issues encountered in solving a problem with hill-climbing. $(4 + 6 = 10)$

(b) Explain the problem of overestimation and underestimation with respect to A* algorithm. (5)

5. (a) Trace the constraint satisfaction procedure by solving the following cryptarithmetic problem: (7)

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  CROSS
+ ROADS
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DANGER
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(b) Explain the working method of the Goal Stack algorithm using the block world problem. (8)

6. (a) What is an adversarial search? Give an example of it. (3)

   (b) Consider the game tree shown below. Find the best path by explaining each step with alpha and beta cutoffs. (12)
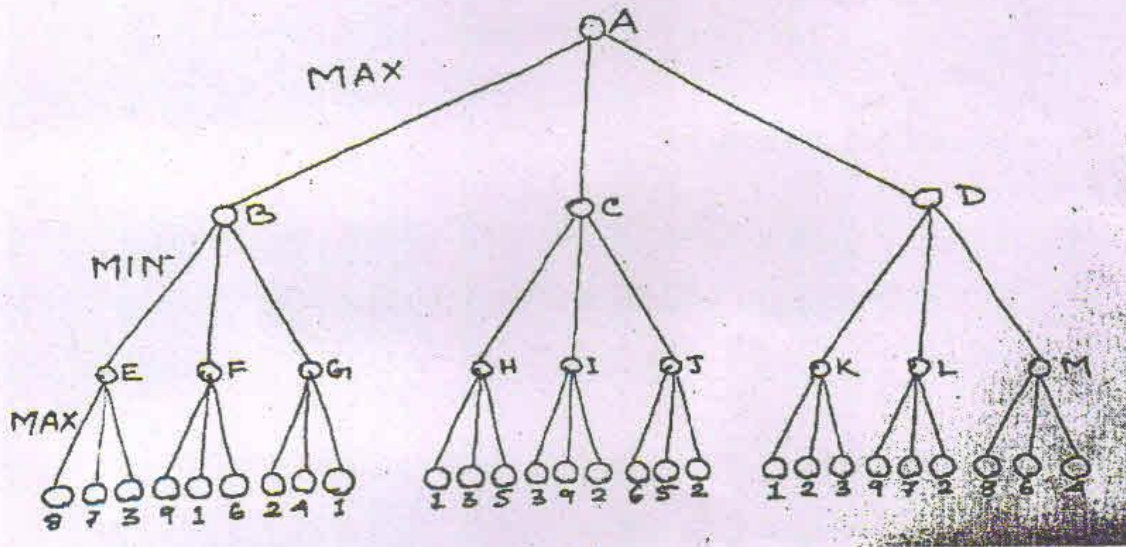
7. Write short notes on the following: (3 × 5 = 15)

   (a) Expert Systems

   (b) Problem Reduction

   (c) Rule-Based Systems

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